PhytoKeys

PhytoKeys 235: 199–210 (2023)
DOI: 10.3897/phytokeys.235.112230

Research Article

Synotis jinpingensis (Asteraceae, Senecioneae), a new species with white ray florets from southeastern Yunnan, China

Liao-Chen Zhao[1*], Ren Chen[2,3*], Zhi-Yong Yu[4], Ming Tang[1], Qin-Er Yang[2,3]

1 *College of Forestry, Jiangxi Agricultural University, Nanchang 330045, Jiangxi, China*
2 *Key Laboratory of Plant Resources Conservation and Sustainable Utilization, South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, Guangdong, China*
3 *Center of Conservation Biology, Core Botanical Gardens, South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, Guangdong, China*
4 *Administrative Bureau of Fenshuiling National Nature Reserve, Jinping 661500, China*

Corresponding author: Ming Tang (tangming@jxau.edu.cn)

Abstract

Synotis jinpingensis (Asteraceae, Senecioneae), a new species from Jinping county in southeastern Yunnan province, China, is described and illustrated. This species is distinguished by having white ray florets in the genus *Synotis*, in which only species with yellow ray florets have been hitherto known. In habit and leaf shape *S. jinpingensis* is most closely similar to *S. duclouxii*, a species occurring in southwestern Guizhou, southern Sichuan and northeastern Yunnan, China, but differs, in addition to the color of ray florets, by having fewer lateral veins of leaves, obviously longer bracts of calyculus, and larger phyllaries. The membership of the new species within *Synotis* is strongly corroborated by evidence from floral micromorphology and phylogenetic analyses based on ITS sequence data. Color photographs of living plants, a distribution map, and provisional IUCN status of *S. jinpingensis* are provided.

Key words: Compositae, floral micromorphology, ITS sequence data, taxonomy

OPEN ACCESS

Academic editor: Peter de Lange
Received: 5 September 2023
Accepted: 22 October 2023
Published: 20 November 2023

Citation: Zhao L-C, Chen R, Yu Z-Y, Tang M, Yang Q-E (2023) *Synotis jinpingensis* (Asteraceae, Senecioneae), a new species with white ray florets from southeastern Yunnan, China. PhytoKeys 235: 199–210. https://doi.org/10.3897/phytokeys.235.112230

Copyright: © Liao-Chen Zhao et al.
This is an open access article distributed under terms of the Creative Commons Attribution License (Attribution 4.0 International – CC BY 4.0).

Introduction

Synotis (Clarke) C. Jeffrey & Y.L. Chen (Asteraceae, Senecioneae), was segregated from *Senecio* L. based on its sub-shrubby habit and anther bases with sterile tailed auricles. *Synotis* is endemic to the Sino-Himalayan region, except for two species occurring in northwestern China and Kyrgyzstan (Jeffrey and Chen 1984; Li et al. 2018). Sixty species are currently recognized in the genus, with 48 recorded in China (Jeffrey and Chen 1984; Chen 1999; Chen et al. 2011; Tang et al. 2013a, b, c, 2014, 2017, 2022; Tong et al. 2017; Li et al. 2020; Liu et al. 2020, 2021; Tang and Chen 2021; Zhang et al. 2021; Fan et al. 2022a, b).

During a botanical trip in March 2022 to southeastern Yunnan, China, we discovered an unusual population of *Synotis* with white ray florets (Fig. 1) in the Fenshuiling National Nature Reserve in Jinping county (Fig. 2). All the previously known species in *Synotis* have yellow ray florets. The habit and the obovate-lanceolate or elliptic leaves of the plants are most closely similar to those of *S. duclouxii*, a species occurring in southwestern Guizhou, southern

* These authors contributed equally to this work.

Sichuan, and northeastern Yunnan, China (Liu et al. 2020) (Fig. 2), but differ by having white florets and several other morphological characters, including fewer nerves on the leaves and longer bracts of calyculus. We conducted floral micromorphological studies and performed phylogenetic analyses based on ITS sequence data to further confirm the membership of the new species within the genus *Synotis*. We therefore determine that the population in question represents a hitherto undescribed species, which we describe below.

Material and methods

Gross morphology

We conducted careful observations of living plants in a population of the new species in Jinping county in southeastern Yunnan, China. All the major morphological characters, including the habit, the shape and size of leaves, involucres, ray and disk florets, and the type of synflorescence, which were observed and photographed On living plants by digital camera (OLYMPUS TG-6, Tokyo).

Floral micromorphology

For the study of three floral micromorphological characters of the new species (voucher: *Z. Y. Yu et al. JXAU 01*, JXAU), including papillae on style arms, filament collar, and anther endothecial cell thickenings in stamens [(for all these three micromorphological characters were considered taxonomic significance in the *Synotis* reported by Jeffrey and Chen (1984) and Tang (2014)], we followed the method of Tang et al. (2014), and all these characters were observed and photographed under microscope (ZEISS AXIO IMAGER A2M, Germany).

Phylogenetic analyses

Based on the results of previous phylogenetic analyses of the tribe Senecioneae (Pelser et al. 2002, 2003, 2007, 2010), we selected 82 samples representing 79 species in 38 genera within Senecioneae for our analyses. These included 30 species of *Senecio* and 13 species in *Synotis*. *Abrotanella emarginata* Cass. (subtribe Abrotanellinae) was selected as a root, according to the results of Pelser et al. (2007, 2010). We generated new sequences for our new species and its putative close ally *S. duclouxii*, and another species *S. cavaleriei* (H. Lév.) C. Jeffrey & Y.L. Chen, while the sequences of other species were retrieved from GenBank. Voucher information and GenBank accession numbers for the material used in this study are given in Appendix 1.

Total genomic DNA of *Synotis cavaleriei*, *S. duclouxii* and our new species were extracted from silica gel-dried leaves using the modified CTAB method of Doyle and Doyle (1987). The nuclear regions (ITS) were sequenced, with the primer pairs ITS4 and ITS5 (White et al. 1990). Amplification and sequencing reactions followed Tang (2014) and Ren et al. (2017).

All sequences were aligned with MAFFT 7.450 (Katoh and Standley 2013). ModelFinder (Kalyaanamoorthy et al. 2017) was used to select the best-fit model using BIC criterion. Maximum Likelihood (ML) analysis was generated

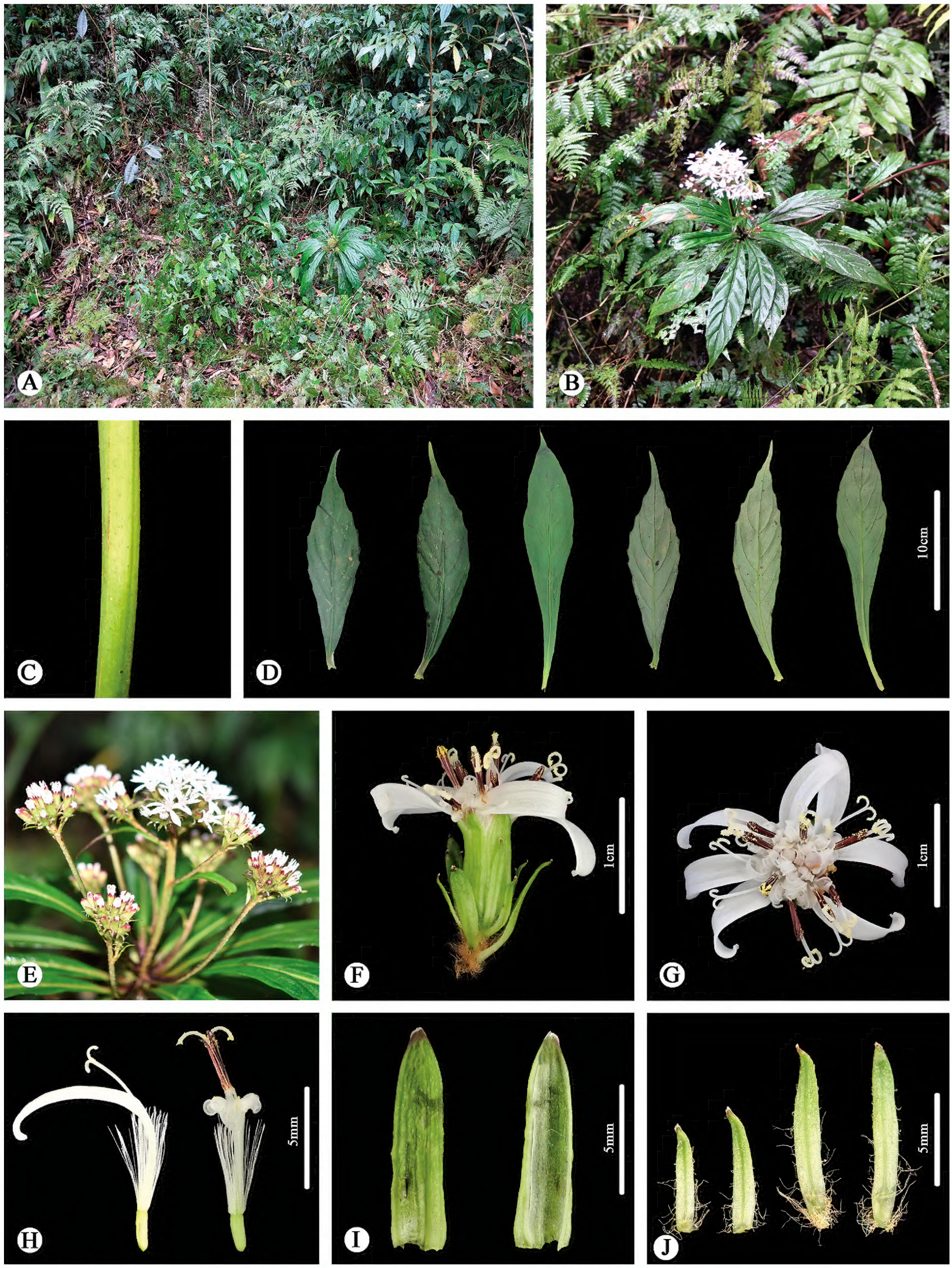

Figure 1. *Synotis jinpingensis* in the wild (Jinping, Yunnan, China) **A** habitat **B** habit **C** portion of stem **D** leaves (left three: adaxial side; right three: abaxial side) **E** synflorescence **F** capitulum (side view) **G** capitulum (top view) **H** florets (left: ray floret; right: disk floret) **I** phyllaries (left: adaxial side; right: abaxial side) **J** bracts of calyculus.

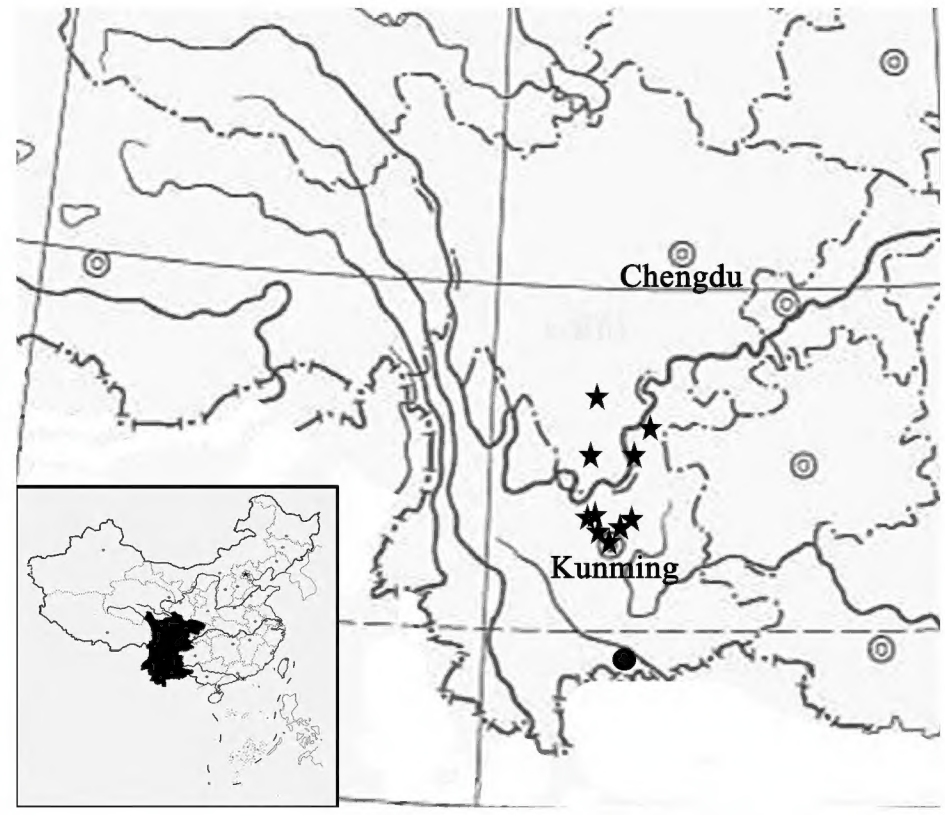

Figure 2. Distribution map of *Synotis jinpingensis* (black dot) and *S. duclouxii* (black star).

by IQ-TREE 2.1.3 (Nguyen et al. 2015), with 20 000 ultrafast bootstraps, under GTR+F+I+I+R3 model by ModelFinder. Bayesian Inference (BI) (Ronquist et al. 2012) analysis was carried out by MrBayes 3.2.6 (Ronquist et al. 2012), under GTR+F+I+G4 model, with 3 000 000 generations, sampling every 1 000 generations to ensure the convergence (average deviation of split frequencies less than 0.01 and the effective sample sizes over 200), in which the first 25% of sampled data treated were discarded as burn-in and the remaining trees were used to estimate the posterior probabilities (PP). Bootstrap percentage (MLBS) values ≥ 70 (Hillis and Bull 1993) and PP values ≥ 0.95 were regarded as strong support.

Results and discussion

Gross morphology

As shown in Figs 1, 2, our new species has a habit typical of *Synotis* ser. *Synotis* (Jeffrey and Chen 1984), with the leaves clustered at the bottom of the synflorescence, indicating that this species should belong to this series. It is readily distinguishable from all other species within the genus by its white ray florets. From its putative closest ally, *S. duclouxii*, the new species differs additionally by having fewer nerves on the leaves (10–14 vs. 18–20), longer bracts of calyculus (6–8 mm vs. 1–3 mm) and larger phyllaries (8–10 mm long, 2–3 mm broad vs. 5–7 mm long, 1–2 mm broad) [see Liu et al. (2020) for morphological characters of *S. duclouxii*].

Floral micromorphology

The central tuft of papillae on the style arms of our new species is prominent, much longer than laterals (Fig. 3A). The anther collars are balusterform (Fig. 3B), the anther tails are ca. 1.5 times as long as antheropodia (Fig. 3B), and the endothecial cell wall thickenings are radial (Fig. 3C). All these characters match well those reported previously in *Synotis* (Jeffrey and Chen 1984; Tang et al. 2013a, b, 2014; Tang 2014; Li et al. 2018) and further confirm the generic affiliation of our new species.

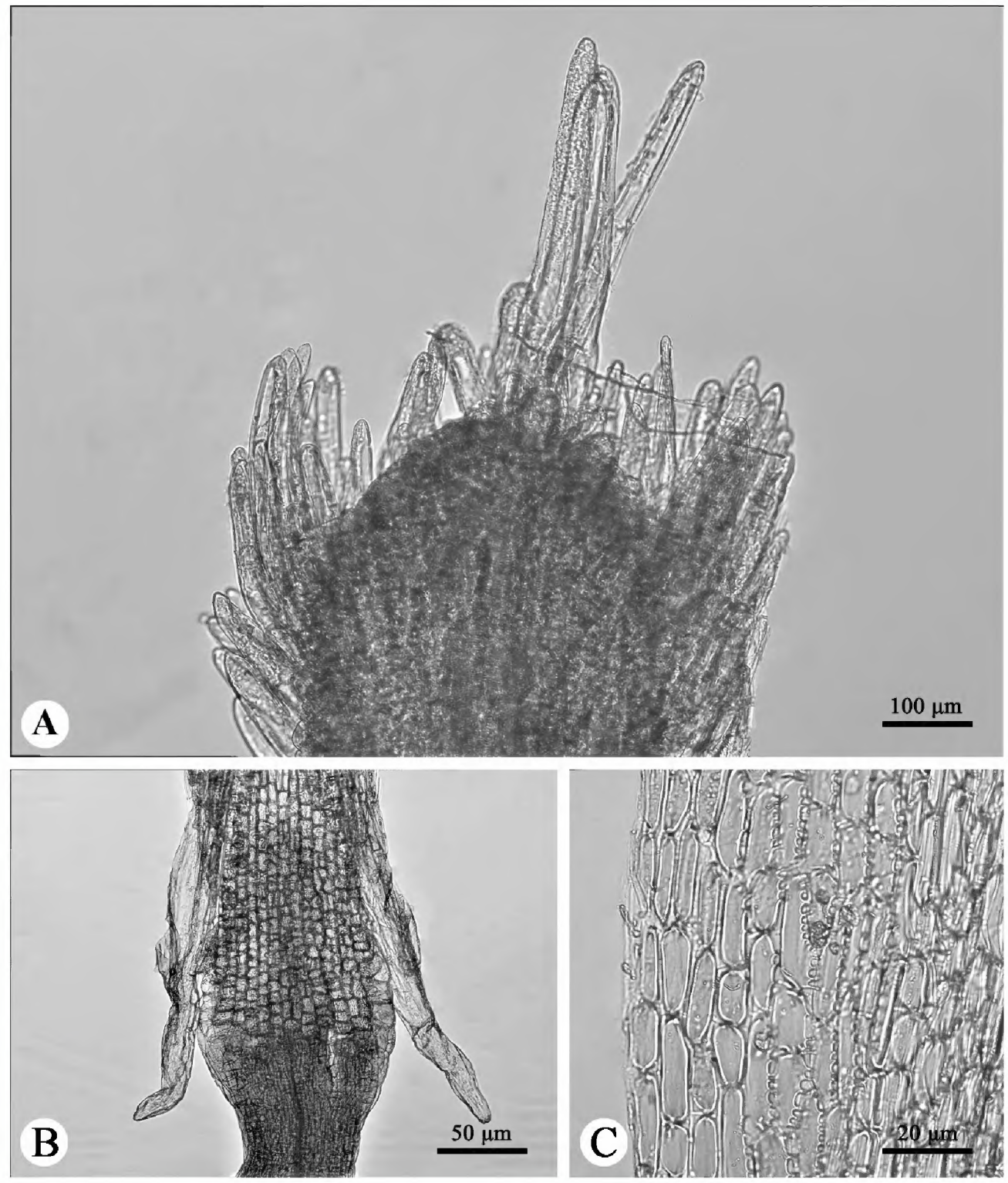

Figure 3. Three micromorphological characters of *Synotis jinpingensis* **A** papillae on style arms **B** anther collar and anther tails **C** anther endothecial cell wall thickenings.

Phylogenetic analyses

Our ML and BI analyses produce almost identical topologies, and they are also consistent with the results of previous studies (Pelser et al. 2007, 2010; Tang et al. 2014; Tong et al. 2017; Li et al. 2018). As shown in the ML tree (Fig. 5), all the sampled species of *Synotis* form a strongly supported clade (MLBS/PP = 99%/1.00) in subtribe Senecioninae and our new species is deeply nested within this clade. The membership of our new species within *Synotis* is thus strongly corroborated by ITS sequence data.

Taxonomic treatment

Synotis jinpingensis **M.Tang, Z.Y.Yu & Q.E.Yang, sp. nov.**
urn:lsid:ipni.org:names:77331168-1
Figs 1, 4

Type. CHINA. Yunnan province: Jinping county, Fenshuiling National Nature Reserve, Guaitang village, in mixed forests, alt. ca. 2400 m, 22°45'36.87"N, 103°28'4.65"E, 30 March 2022, *Z.Y. Yu et al. JXAU 01* (holotype: JXAU; isotypes: IBSC, JXAU). Fig. 4.

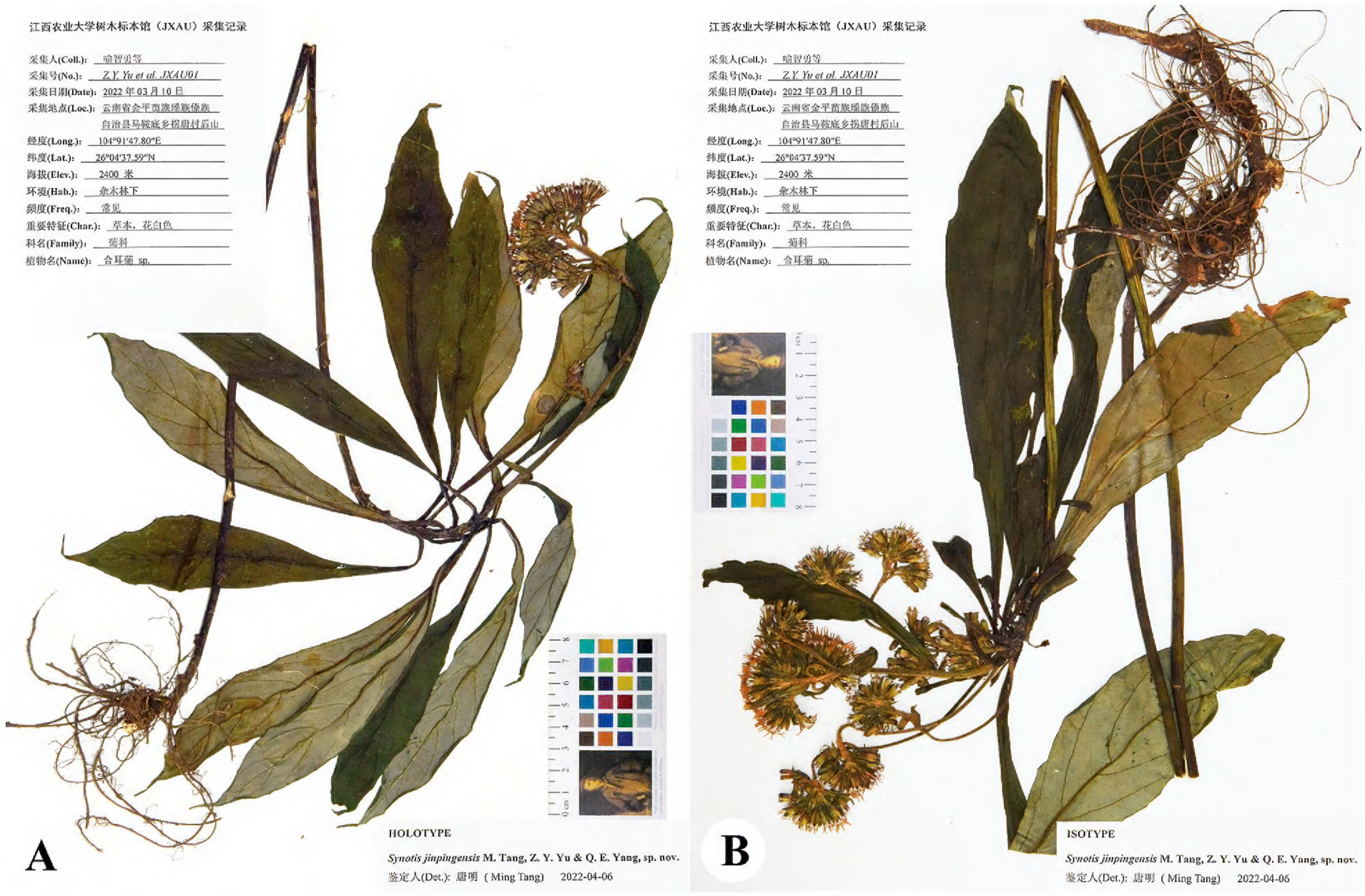

Figure 4. Holotype (**A**) and isotype (**B**) sheets of *Synotis jinpingensis*.

Diagnosis. *Synotis jinpingensis* is most closely similar to *S. duclouxii* in habit and leaf shape, but differs by having white (vs. yellow) ray florets, fewer nerves on the leaves (10–14 vs. 18–20), longer bracts of calyculus (6–8 mm vs. 1–3 mm), and larger phyllaries (8–10 mm long, 2–3 mm broad vs. 5–7 mm long, 1– 2 mm broad).

Description. Perennial herbs, erect, rhizomatous. Rhizome thick, horizontal. Vegetative stems solitary, simple, rarely branched, erect, 50–100 cm tall, median and lower parts subglabrous, upper part often densely yellowish setulose. Flowering stems solitary, erect, scapiform, 15–30 cm tall, few-branched, fulvous tomentose. Leaves always aggregate at base of fertile shoot; petioles 1–1.5 cm long; blades obovate-lanceolate or elliptic, 12–18 cm long, 2.5–4 cm broad, papyraceous, abaxially glabrous or subglabrous, adaxially sparsely pubescent, pinnately veined, lateral veins 10–14, arcuate-ascending, base cuneate, margin shallowly sinuate-apiculate, apex acute-acuminate. Stem leaves on reproductive shoots few, narrowly lanceolate, remote, much smaller. Capitula radiate, numerous, arranged in an attenuate broadly paniculoid corymb; peduncles 3–5 mm long, fulvous tomentose, 1- or 2-bracteate; bracts below capitula linear, 5–20 mm long. Involucres cylindric-campanulate, 8–10 mm long, 2–3 mm broad, with 7–10 subulate bracteoles at base, bracts of calyculus linear, 6–8 mm long, green, apically purple; phyllaries usually 7 or 8, occasionally 5 or 6, oblong, 2–3 mm broad, green, herbaceous, glabrous, apically acute, purple. Ray florets 7 or 8; corolla tube 3.5–4.5 mm long, glabrous; lamina white, oblong-lanceolate, 6–9 mm long, 1.5–2.5 mm broad, 3–4-veined, apically obtuse, 3-denticulate. Disk florets 8–12, white; corolla 4–5 mm long, with ca. 4.5 mm long tube and funnelform limb; lobes ovate-oblong, 3–3.5 mm long, apically acute. Anthers ca. 3 mm, anther tails ca. 1.5 times as long as antheropodia;

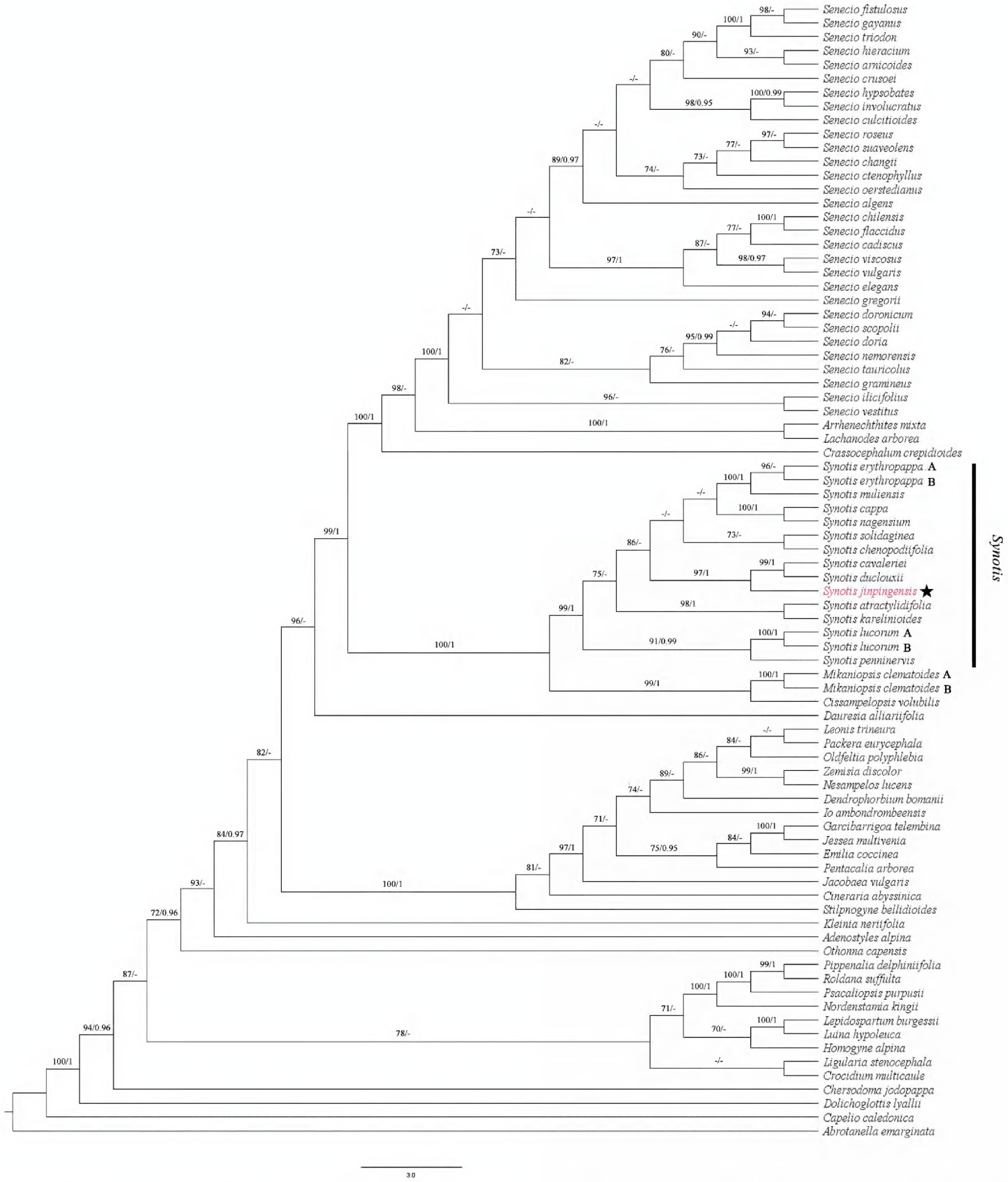

Figure 5. The maximum likelihood tree of tribe Senecioneae based on ITS dataset, with *Synotis jinpingensis* highlighted in red font. Bootstrap values (MLBS) and posterior probabilities (PP) are indicated above the branches. Dashes (-) indicate MLBS < 70% or PP < 0.95.

appendages ovate-oblong; antheropodia slightly dilated at base. Style branches ca. 2 mm long, fringed with long fine papillae, the central tuft prominent, much longer than laterals. Achenes 1.8–2 mm, glabrous. Pappus white, 6–7.5 mm long.

Phenology. Flowering from March to April; fruiting from April to July.

Etymology. The species is named after its type locality, i.e., Jinping county in southeastern Yunnan province, China.

Distribution and habitat. *Synotis jinpingensis* is currently known from its type locality, i.e., Jinping county in southeastern Yunnan province, China (Fig. 2). It grows in mixed forests at an altitude of ca. 2400 m above sea level.

Conservation status. *Synotis jinpingensis* seems currently known only from its type locality. Four small populations of this species, each with ca. 100 individuals, have been discovered there. The habitat of *S. jinpingensis* is now well preserved. The discovery of further populations of this species is to be expected as botanical exploration of southeastern Yunnan proceeds. According to the IUCN Red List Categories and Criteria (IUCN 2022), the new species may better be categorized as Data Deficient (DD).

Acknowledgements

We thank Dr. Patricio Saldivia Pérez and Dr. Rob Smissen for their helpful comments which helped to improve our manuscript. We also thank Mr. Zongli Liang, Mr. Jianhong Li and Mr. Hailong He with the Fenshuiling National Nature Reserve in Jinping county, Yunnan, China, for their help with the field work.

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Funding

This work was supported by the National Natural Science Foundation of China (grant no. 31960043).

Author contributions

Data curation: ZYY. Formal analysis: RC, LCZ. Writing – original draft: MT. Writing – review and editing: QEY.

Author ORCIDs

Liao-Chen Zhao https://orcid.org/0000-0002-6300-7301
Ren Chen https://orcid.org/0000-0002-0910-9737
Zhi-Yong Yu https://orcid.org/0000-0001-8276-5901
Ming Tang https://orcid.org/0000-0001-8419-0996
Qin-Er Yang https://orcid.org/0000-0002-6261-0731

Data availability

All of the data that support the findings of this study are available in the main text.

References

Chen YL (1999) Senecioneae Cass. In: Chen YL (Ed.) Flora Reipublicae Popularis Sinicae (Vol. 77). Science Press, Beijing, 326 pp.

Chen YL, Nordenstam B, Jeffrey C (2011) *Synotis* (C.B.Clarke) C.Jeffrey & Y.L.Chen. In: Wu ZY, Raven PH, Hong DY (Eds) Flora of China (Vols 20–21). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, 489–505.

Doyle JJ, Doyle JL (1987) A rapid DNA isolation procedure for small quantities of fresh leaf tissue. Phytochemical Bulletin 19: 11–15.

Fan Y, Wang LY, Zhang R, Tang M (2022a) Notes on the specific identity of *Synotis damiaoshanica* (Compositae, Senecioneae), with clarification of the confusing identities of *S. guizhouensis* and *S. sinica*. Phytotaxa 543(2): 150–160. https://doi.org/10.11646/phytotaxa.543.2.5

Fan Y, Zhang R, Guo CL, Tang M (2022b) On the identity of *Synotis ionodasys* (Asteraceae: Senecioneae) from Yunnan, China. Phytotaxa 545(2): 207–216. https://doi.org/10.11646/phytotaxa.545.2.9

Hillis DM, Bull JJ (1993) An empirical test of bootstrapping as a method for assessing confidence in phylogenetic analysis. Systematic Biology 42(2): 182–192. https://doi.org/10.1093/sysbio/42.2.182

IUCN (2022) Guidelines for Using the IUCN Red List Categories and Criteria. Version 15. Prepared by the Standards and Petitions Committee. http://www.iucnredlist.org/documents/RedListGuidelines.pdf

Jeffrey C, Chen YL (1984) Taxonomic studies on the tribe Senecioneae (Compositae) of Eastern Asia. Kew Bulletin 39(2): 205–446. https://doi.org/10.2307/4110124

Kalyaanamoorthy S, Minh B, Wong T, von Haeseler A, Jermiin L (2017) ModelFinder: Fast model selection for accurate phylogenetic estimates. Nature Methods 14(6): 587–589. https://doi.org/10.1038/nmeth.4285

Katoh K, Standley DM (2013) MAFFT multiple sequence alignment software version 7: Improvements in performance and usability. Molecular Biology and Evolution 30(4): 772–780. https://doi.org/10.1093/molbev/mst010

Li HM, Lazkov GA, Illarionova ID, Tong TJ, Shao YY, Ren C (2018) Transfer of *Senecio karelinioides* (AsteraceaeSenecioneae) to *Synotis* based on evidence from morphology, karyology and ITS/ETS sequence data. Nordic Journal of Botany 36(7): e01838. https://doi.org/10.1111/njb.01838

Li Z, Zheng HL, Tang M (2020) *Synotis panzhouensis* (Asteraceae, Senecioneae), a distinct new species with red-purple pappus from southwestern Guizhou, China. PhytoKeys 166: 79–86. https://doi.org/10.3897/phytokeys.166.58654

Liu YL, Zhang R, Ren C, Liu B, Zhang Y, Tang M (2020) On the specific identity of Chinese endemic species *Synotis longipes* (Compositae-Senecioneae). Phytotaxa 472(3): 269–276. https://doi.org/10.11646/phytotaxa.472.3.5

Liu YL, Zhu XX, Peng YL, Tang M (2021) *Synotis jinshajiangensis* (Asteraceae: Senecioneae), a new species from northwestern Yunnan, China. Phytotaxa 478(1): 162–170. https://doi.org/10.11646/phytotaxa.478.1.12

Nguyen LT, Schmidt HA, Von Haeseler A, Minh BQ (2015) IQ-TREE: A fast and effective stochastic algorithm for estimating maximum-likelihood phylogenies. Molecular Biology and Evolution 32(1): 268–274. https://doi.org/10.1093/molbev/msu300

Pelser PB, Gravendeel B, van der Meijden R (2002) Tackling speciose genera: Species composition and phylogenetic position of *Senecio* sect. *Jacobaea* (Asteraceae) based on plastid and nrDNA sequences. American Journal of Botany 89(6): 929–939. https://doi.org/10.3732/ajb.89.6.929

Pelser PB, Gravendeel B, van der Meijden R (2003) Phylogeny reconstruction in the gap between too little and too much divergence: The closest relatives of *Senecio jacobaea*

(Asteraceae) according to DNA sequences and AFLPs. Molecular Phylogenetics and Evolution 29(3): 613–628. https://doi.org/10.1016/S1055-7903(03)00139-8

Pelser PB, Nordenstam B, Kadereit J, Watson L (2007) An ITS phylogeny of tribe Senecioneae (Asteraceae) and a new delimitation of *Senecio* L. Taxon 56(4): 1077–1104. https://doi.org/10.2307/25065905

Pelser PB, Kennedy AH, Tepe EJ, Shidler JB, Nordenstam B, Kadereit JW, Watson LE (2010) Patterns and causes of incongruence between plastid and nuclear Senecioneae (Asteraceae) phylogenies. American Journal of Botany 97(5): 856–873. https://doi.org/10.3732/ajb.0900287

Ren C, Hong Y, Wang L, Yang QE (2017) Generic recircumscription of *Parasenecio* (Asteraceae: Senecioneae) based on nuclear ribosomal and plastid DNA sequences, with descriptions of two new genera. Botanical Journal of the Linnean Society 184(4): 418–443. https://doi.org/10.1093/botlinnean/box034

Ronquist F, Teslenko M, van der Mark P, Ayres DL, Darling A, Höhna S, Larget B, Liu L, Suchard MA, Huelsenbeck JP (2012) MrBayes 3.2: Efficient Bayesian phylogenetic inference and model choice across a large model space. Systematic Biology 61(3): 539–542. https://doi.org/10.1093/sysbio/sys029

Tang M (2014) A systematic study of the genus *Synotis* (Compositae-Senecioneae). PhD thesis. University of Chinese Academy of Sciences, Beijing.

Tang M, Chen YS (2021) *Blumea hunanensis* is a synonym of *Synotis nagensium* (Asteraceae: Senecioneae). Phytotaxa 487(2): 149–156. https://doi.org/10.11646/phytotaxa.487.2.5

Tang M, Hong Y, Yang QE (2013a) *Synotis baoshanensis* (Asteraceae), a new species from Yunnan, China. Botanical Studies 54(1): 1–5. https://doi.org/10.1186/1999-3110-54-17

Tang M, Wang LY, Yang QE (2013b) *Synotis xinningensis* (Asteraceae), a new species from Hunan, China. Botanical Studies 54(1): 1–6. https://doi.org/10.1186/1999-3110-54-16

Tang M, Wang LY, Yang QE (2013c) The identity of *Synotis cordifolia* (Asteraceae-Senecioneae). Redai Yaredai Zhiwu Xuebao 21(2): 101–108.

Tang M, Ren C, Yang QE (2014) *Parasenecio chenopodiifolius* (Compositae-Senecioneae) is a *Synotis* and conspecific with *S. otophylla* based on evidence from morphology, cytology and ITS/ETS sequence data. Nordic Journal of Botany 32(6): 824–835. https://doi.org/10.1111/njb.00574

Tang M, Ren C, Yang QE (2017) Reinstatement of the Sino-Himalayan species *Senecio* pentanthus (Asteraceae, Senecioneae). Phytotaxa 292(3): 253–261. https://doi.org/10.11646/phytotaxa.292.3.5

Tang M, Ren C, Chen YS, Yang QE (2022) *Synotis nyalamensis* (Asteraceae, Senecioneae), a new species from southern Xizang (Tibet), China. Phytotaxa 554(3): 278–284. https://doi.org/10.11646/phytotaxa.554.3.6

Tong TJ, Tang M, Ren C, Yang QE (2017) *Senecio kumaonensis* (Asteraceae, Senecioneae) is a *Synotis* based on evidence from karyology and nuclear ITS/ETS sequence data. Phytotaxa 292(1): 35–46. https://doi.org/10.11646/phytotaxa.292.1.3

White TJ, Bruns T, Lee S, Taylor J (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis MA, Gelfand DH, Sninsky JJ, White TJ (Eds) PCR Protocols: a Guide to Methods and Applications. Academic Press, New York, 315–322. https://doi.org/10.1016/B978-0-12-372180-8.50042-1

Zhang R, Liu YL, Tang M (2021) Four new synonyms in *Synotis* (Asteraceae, Senecioneae). Phytotaxa 483(3): 255–266. https://doi.org/10.11646/phytotaxa.483.3.5

Appendix 1

Table A1. Voucher information and GenBank accession of species used in our study.

GenBank	Species	Voucher information	Herbarium
MH371137	*Synotis atractylidifolia* (Y. Ling) C. Jeffrey & Y. L. Chen	M. Tang & L. Wang 361	IBSC
EF538402	*Synotis cappa* (Buch.-Ham. ex D. Don) C. Jeffrey & Y. L. Chen	Tessier-Yandell 86	IBSC
KJ851593	*Synotis chenopodiifolia* (DC.) M. Tang et al.	M. Tang & C. Ren 532	IBSC
KU696133	*Synotis erythropappa* (Bureau & Franch.) C. Jeffrey & Y. L. Chen **A**	C. Ren 150	IBSC
MH117782	*Synotis erythropappa* (Bureau & Franch.) C. Jeffrey & Y. L. Chen **B**	YLDP026D	IBSC
MH371138	*Synotis karelinioides* (C. Winkl.) C. Ren et al.	H.M. Li & Q.G. Mao 325	IBSC
AY723255	*Synotis lucorum* (Franch.) C. Jeffrey & Y. L. Chen **A**	J.Q. Liu 2177	IBSC
KU696134	*Synotis lucorum* (Franch.) C. Jeffrey & Y. L. Chen **B**	Q.E. Yang et al. 3128	IBSC
KU696135	*Synotis muliensis* Y. L. Chen	C. Ren 148	IBSC
AF459922	*Synotis nagensium* (C. B. Clarke) C. Jeffrey & Y. L. Chen	B. Bartholomew et al. 1991	IBSC
KY347902	*Synotis penninervis* (H. Koyama) T.J. Tong et al.	M. Tang & C. Ren 626	IBSC
KX549951	*Synotis solidaginea* (Hand.-Mazz.) C. Jeffrey & Y. L. Chen	2015XZ001-B	IBSC
–	*Synotis duclouxii* (Dunn) C. Jeffrey & Y. L. Chen	C. Ren & L.Y. Wang 485	IBSC
–	*Synotis cavaleriei* (H. Lév.) C. Jeffrey & Y. L. Chen	L.Y. Wang 72	IBSC
–	*Synotis jinpingensis* M. Tang et al.	Y. Yu et al. JXAU01	JXAU
EF538296	*Senecio algens* Wedd.	S.G. Beck 2879	S
EF538298	*Senecio arnicoides* Hook. & Arn.	O. Zoellner 3474	L
GU818506	*Senecio cadiscus* B. Nord. & Pelser	Rourke 1118	S
KU499905	*Senecio changii* C. Ren & Q. E. Yang	C. Ren et al. WL146	IBSC
EF538313	*Senecio chilensis* Less.	O. Zollner 2958	S
EF538290	*Senecio crusoei* Pelser	T. Stussey 6560	H
EF538322	*Senecio ctenophyllus* Phil.	O. Zoellner 3959	U
EF538312	*Senecio culcitioides* Wedd.	B. Ollgaard & H. Balslev 8822	CHR
AF459946	*Senecio doria* L.	P.B. Pelser cult. 129	WIS
JX895355	*Senecio doronicum* (L.) L.	J. Calvo 4000	WIS
GU818642	*Senecio elegans* L.	Cron & Goodman 687	–
EF538335	*Senecio fistulosus* Poepp. ex Less.	S.G. Beck & M. Liberman 9672	MJG
EF538336	*Senecio flaccidus* Less.	J. Thuret s.n.	MJG
GU818649	*Senecio gayanus* DC.	M. Rosas 2157	–
GU818650	*Senecio gramineus* Harv.	F.K. Hoener 2104	–
GU818651	*Senecio gregorii* F. Muell.	D.E. Albrecht 7091	–
GU818652	*Senecio hieracium* J. Rémy	M. Baeza & L. Finot 3695	–
EF538348	*Senecio hypsobates* Wedd	B. Ollgaard & H. Balslev 9863	U
GU818662	*Senecio ilicifolius* L.	Cron & Goodman 686	
EF538150	*Senecio involucratus* (Kunth) DC.	B. Nordenstam 9438	L
AF459937	*Senecio nemorensis* L.	P.B. Pelser cult.102	L
EF538362	*Senecio oerstedianus* Benth.	B. Nordenstam 9160	S
EF538373	*Senecio roseus* Sch. Bip.	J. Garcia P. 250	U
JX895384	*Senecio scopolii* Hoppe & Hornsch. ex Bluff & Fingerh.	J. Calvo 4715	–
EF538222	*Senecio suaveolens* (L.) Elliott	D.C. Dister s.n.	MJG
GU817570	*Senecio tauricolus* V. A. Matthews	Budak et al. 1735	–

GenBank	Species	Voucher information	Herbarium
GU818707	*Senecio triodon* Phil.	F. Luebert & S. Teillier 2266	–
GU818708	*Senecio vestitus* P. J. Bergius	W. Greuter 21766	–
AF459925	*Senecio viscosus* L.	P.B. Pelser 300	TEX
AF459924	*Senecio vulgaris* L.	P.B. Pelser cult. 188	CHR
GU818721	*Stilpnogyne bellidioides* DC.	P. Goldblatt & L. Porter 11729	–
EF538416	*Zemisia discolor* (Sw.) B. Nord.	G.L. Webster et al. 8420	S
EF538143	*Abrotanella emarginata* (Gaudich.) Cass.	R.N.P. Goodall & J. Wood 3352	MU
EF538146	*Adenostyles alpina* Bluff & Fingerh.	C.H. Uhink 98-189a	MJG
EF538156	*Arrhenechthites mixta* (A. Rich.) Belcher	M.E. Lawrence 1308	S
GU818508	*Capelio caledonica* B. Nord.	B. Nordenstam 9644	–
EF538167	*Chersodoma jodopappa* (Sch. Bip.) Cabrera	I. Hensen 2617	S
GU818512	*Cineraria abyssinica* Sch. Bip. ex A. Rich.	P.B. Pelser cult. 208	L
EF538172	*Cissampelopsis volubilis* (Blume) Miq.	Carvalho 3175	US
AF459968	*Crassocephalum crepidioides* (Benth.) S. Moore	P.B. Pelser cult. 354	S
GU818541	*Crocidium multicaule* Hook.	B. Bartholomew 5749	–
AF457413	*Dauresia alliariifolia* (O. Hoffm.) B. Nord. & Pelser	Mueller & Tilson 907	–
EF538181	*Dendrophorbium bomanii* (R. E. Fr.) C. Jeffrey	M. Dematteis & G. Seijo 722	MU
GU818546	*Dolichoglottis lyallii* (Hook. f.) B. Nord.	A. Strid 22172	–
AF459966	*Emilia coccinea* (Sims) G. Don	P.B. Pelser cult. 126	MJG
EF538211	*Garcibarrigoa telembina* (Cuatrec.) Cuatrec.	L. Holm-Nielsen et al. 6211	S
KU570815	*Homogyne alpina* Cass.	Comes 11	MJG
GU818559	*Io ambondrombeensis* (Humbert) B. Nord.	S.T. Malcomber et al. 1380	–
AF459941	*Jacobaea vulgaris* Gaertn.	P.B. Pelser cult. 6	S
EF538246	*Jessea multivenia* (Benth.) H. Rob. & Cuatrec.	B. Nordenstam 9161	K
GU818568	*Kleinia neriifolia* Haw.	P.B. Pelser cult. 216	–
GU818574	*Lachanodes arborea* (Roxb.) B. Nord.	R. Cairns-Wicks s.n.	–
EF538249	*Leonis trineura* (Griseb.) B. Nord.	Smith et al. 3238	L
EF538250	*Lepidospartum burgessii* B.L. Turner	R.D. Worthington 12382	L
AF459961	*Ligularia stenocephala* (Maxim.) Matsum. & Koidz.	R.R. Kowal 3092	WIS
GU818593	*Luina hypoleuca* Benth.	W. Greuter 17706	–
GU818595	*Mikaniopsis clematoides* (Sch. Bip. ex A. Rich.) Milne-Redh. **A**	W.J.J.O. de Wilde & B.E.E. de Wilde-Duyfjes 9006	–
GU817581	*Mikaniopsis clematoides* (Sch. Bip. ex A. Rich.) Milne-Redh. **B**	I. Friis et al. 499	–
EF538266	*Nesampelos lucens* (Poir.) B. Nord.	Zanoni 45570	JBSD
EF538267	*Nordenstamia kingii* (H. Rob. & Cuatrec.) B. Nord.	B. Stahl 5572A	S
EF538271	*Oldfeltia polyphlebia* (Griseb.) B. Nord. & Lundin	B. Nordenstam & R. Lundin 340	S
AF459960	*Othonna capensis* L. H. Bailey	P.B. Pelser cult. 106	S
GU818608	*Packera eurycephala* (Torr. & A. Gray) W.A. Weber & Á. Löve	M.A. Vincent 8581	MU
EF538283	*Pentacalia arborea* (Kunth) H. Rob. & Cuatrec.	B. Ollgaard & H. Balslev 8298	MU
GU818627	*Pippenalia delphiniifolia* (Rydb.) McVaugh	Spellenberg & Bacon 11048	–
GU818629	*Psacaliopsis purpusii* (Greenm. ex Brandegee) H. Rob. & Brettell	Panero et al. 2607	–
GU818631	*Roldana suffulta* (Greenm.) H. Rob. & Brettell	Rzedowski 36569	–